

P E T I T I O N

To the Commissioner of Patents and Trademarks
Washington, D.C. 20231

Your Petitioner, R. MICHAEL GROSS, a citizen of the United States and a resident of the State of Nebraska, whose post office address is 1726 South 87th Street, Omaha, Nebraska 68124, prays that Letters Patent may be granted to him for the improvement in a

METHOD AND MEANS FOR CEMENTING A LINER ONTO THE FACE OF THE GLENOID CAVITY OF A SCAPULA

as set forth in the following specification.

CROSS-REFERENCE TO RELATED APPLICATION

This is a divisional application of Petitioner's earlier application Serial No. 09/563,613 filed May 2, 2000, entitled " METHOD AND MEANS FOR CEMENTING A LINER ONTO THE FACE OF THE GLENOID CAVITY OF A SCAPULA".

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

This invention relates to a method of cementing a liner onto the face of the glenoid cavity of a scapula and a tool which is used to perform the method.

2. DESCRIPTION OF THE RELATED ART

Humeral endoprotheses were introduced for the treatment of fractures of the proximal humerus and arthritis of the shoulder joint in the early 1950s. This operation evolved into a complete shoulder replacement with the addition of a high density polyethylene surface to cover the glenoid cavity which is located on the scapular side of

1 the glenohumeral joint. Firm fixation of the polyethylene to the small glenoid cavity with
acrylic cement called Methyl Methacrylate has been a constant problem. The complex
mechanics of the shoulder joint accentuate this problem and frequently leads to
loosening of the polyethylene liner. This difficulty has led many surgeons simply to
5 return to the early surgery of a humeral endoprotheses and omit the polyethylene liner
despite its superior pain relieving qualities.

SUMMARY OF THE INVENTION

10 The method of cementing a liner onto the face of the glenoid cavity of a scapula
which includes a glenoid vault, and a coracoid process projecting from the scapula,
comprises the steps of: (1) creating an opening in the coracoid process adjacent the
outer end thereof which communicates with the medullary canal of the coracoid
process; (2) creating an elongated bore in the medullary canal which extends from the
opening in the coracoid process to the glenoid vault of the scapula; (3) inserting an
15 elongated, hollow, rigid tube, having distal and proximal ends, through the opening and
through the bore so that the distal end thereof is positioned in the glenoid vault;
(4) placing the distal end of an elongated sleeve, which is slidably mounted on the tube,
into sealing engagement with the outer end of the coracoid process; (5) applying suction
to the proximal end of the tube to suction fluid and debris from the glenoid vault
20 outwardly through the tube; (6) positioning cement on the face of the glenoid cavity and
forcing cement into the glenoid vault while suction is applied to the tube; and (7)
positioning the liner on the face of the glenoid cavity so that the liner is brought into
contact with the cement.

1 The tool for performing the above-described method comprises an elongated,
hollow, rigid tube having distal and proximal ends with the distal end of the tube having
either an angular portion or a curved portion which has a plurality of openings formed
therein. The tube has a length such that the distal end thereof may be positioned in the
5 glenoid vault and so that the proximal end of the tube may be placed in communication
with a source of suction. An elongated sleeve member is slidably mounted on the tube
and preferably has a sealing gasket at its distal end which may be moved into sealing
engagement with the coracoid process around the opening formed therein. A flexible
10 obturator is selectively extended through the tube to clear the tube of debris.

It is therefore a principal object of the invention to provide an improved method of
cementing a liner onto the face of the glenoid cavity of a scapula.

A further object of the invention is to provide a tool for use in cementing a liner
onto the face of the glenoid cavity of a scapula.

15 These and other objects will be apparent to those skilled in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of the apparatus of this invention;

Figure 2 is a partial longitudinal sectional view of the tool of Figure 1;

20 Figure 3 is a view illustrating the tool of this invention being inserted through the
medullary canal of a coracoid process; and

Figure 4 is a view similar to Figure 3 except that the tool is being inserted through
the coracoid process at a somewhat different angle.

DESCRIPTION OF THE PREFERRED METHOD AND EMBODIMENT

In the drawings, the numeral 10 refers to the glenoid cavity of a scapula 12. The numeral 14 refers to the coracoid process which is a bony prominence on the anterior portion of the scapula which attaches just medial to the glenoid cavity. The coracoid process 14 includes a medullary canal 16 therein which is contiguous with the cancellous bone behind the glenoid cavity. The numeral 18 refers to the humerus of the glenohumeral joint. The numeral 19 refers to the glenoid vault in the scapula 12. The difficulty in cementing a high density polyethylene liner onto the face of the glenoid cavity 10 is the driving force behind the instant invention.

The tool which is used in the method described herein is referred to generally by the reference numeral 20 and comprises an elongated, hollow, rigid tube 22 having a distal end 24 and a proximal end 25. The distal end 24 of the tube 20 is provided with an angular or arcuate portion referred to generally by the reference numeral 26. Angular or arcuate portion 26 is preferably provided with a plurality of small openings 28 formed therein. The length of the tube 22 is such that the distal end 24 thereof may be positioned in the glenoid vault 19 and so that the proximal end 25 thereof may be placed in communication with a source of vacuum or suction, as will be described in more detail hereinafter.

The numeral 32 refers to an elongated sleeve which is slidably mounted on tube 22. Sleeve 32, for purposes of description, will be described as having a distal end 32 and a proximal end 34. As seen in the drawings, the distal end 32 is provided with a flared portion 36 which presents a sealing surface 38, as will be described hereinafter.

1 Preferably, a sealing gasket 40 is provided at the end of flare 36 which is adapted to
engage the coracoid process 14. An elongated flexible obturator 42 is provided which is
adapted to be selectively extended through the tube 22 to keep tube 22 free of debris.

5 The method of utilizing the tool will now be described. First, an incision is
created in the shoulder of the patient to expose the outer end of the coracoid process
14 and to provide access to the glenoid cavity 10. An opening 44 is then drilled through
the outer end of the coracoid process 14 so that the opening communicates with the
medullary canal 16. The medullary canal 16 is then hollowed out by the use of a curette
10 or the like. Tube 22 is then inserted through the opening 44 and the hollowed out
medullary canal 16 so that the distal end thereof is positioned in the glenoid vault 19, as
illustrated in Figures 3 and 4. Figure 4 illustrates the situation where the opening 44 is
located somewhat laterally of the opening 44 in Figure 3. The sleeve 32 is then
preferably slidably moved on the tube 22 so that the gasket 40 sealably engages the
15 outer end of the coracoid process 14 around the opening 44 created in the outer end of
the coracoid process 14. The proximal end 25 of the tube 22 is then placed in
communication with a source of suction or vacuum. The suction applied to the tube 22
sucks out the blood and fluids in the glenoid vault 19 to remove competing hydrostatic
20 forces that arise when the surgeon pushes or compacts the cement into the glenoid
vault 19 through the glenoid cavity 10. When the glenoid vault 19 has been cleared of
blood, fluids, debris, etc., a drier surface in the glenoid vault 19 is provided and provides
a more porous surface for the cement to adhere to. The surgeon then applies
compressive force to the cement from the face of the glenoid cavity 10 to force the
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1 cement into the glenoid vault 19. The sucking or pulling force from the tube 22 adds to
the compressive force insertion of the cement to literally pull the cement into the
honeycombed cancellous bone of the glenoid vault 19. A high density polyethylene
liner is then positioned on the face of the glenoid cavity 10 so as to be brought into
5 contact with the cement thereon. Once the liner has sufficiently adhered to the cement,
the tube 22 is removed. If required, the opening 44 at the outer end of the coracoid
process 14 is then sealed.

Thus it can be seen that a novel method and means has been provided for
enhancing the attachment of a high density polyethylene liner to the glenoid cavity.

Thus it can be seen that the invention accomplishes at least all of its stated
objectives.